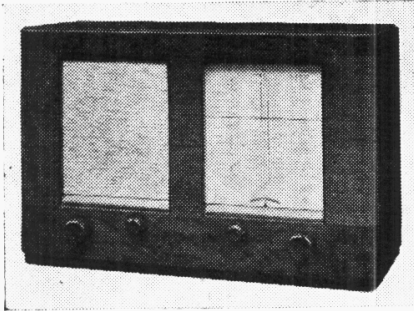


"TRADER" SERVICE SHEET

365

K.B. 730

3-BAND AC SUPERHET



SUITABLE for mains of 200-250 V, 40-60 C/S, the Kolster-Brandes 730 is a 4-valve (plus rectifier) AC 3-band superhet with a triode-hexode frequency changer, a variable-mu pentode IF amplifier, a double-diode triode and a pentode output valve.

Features are a short-wave range of 16.5-52 m and provision for both a gramophone pick-up and an extension speaker, a plug being provided for muting radio and a screw-type switch allowing the internal speaker to be cut out.

Release date: June, 1938.

CIRCUIT DESCRIPTION

Aerial input via coupling condenser **C1** and coupling coil **L1** (SW) or coupling condenser **C2** (MW and LW) to single tuned circuits **L2, C23** (SW), **L3, C23** (MW)

and **L4, C23** (LW) which precede triode hexode valve (**V1, Osram metallised X41** or **Brimar 20A1**) operating as frequency changer with internal coupling. Triode oscillator grid coils **L5** (SW), **L6** (MW) and **L7** (LW) are tuned by **C24**; parallel trimming by **C25** (SW), **C26** (MW) and **C27** (LW); series tracking by **C29** (MW) and **C28** (LW). Reaction on SW by coupling coil **L8** and on MW and LW by direct coupling between oscillator anode and tuning coils via coupling condenser **C5**.

Second valve (**V2, Brimar 9D2**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C30, L9, L10, C31** and **C32, L11, L12, C33**.

Intermediate frequency 464 KC/S.
Diode second detector is part of double diode triode valve (**V3, Brimar 11D3**). Audio frequency component in rectified output is developed across load resistance **R12** and passed via IF stopper **R11**, plug **X** and socket, AF coupling condenser **C11** and manual volume control **R14** to CG of triode section, which operates as AF amplifier. IF filtering by **C10, R11**. Variable tone control by RC filter **C12, R13**. Provision for connection of gramophone pick-up across **R14**, radio being muted by the withdrawal of plug **X**.

Second diode of **V3**, fed from **V2** anode via **C9**, provides DC potential which

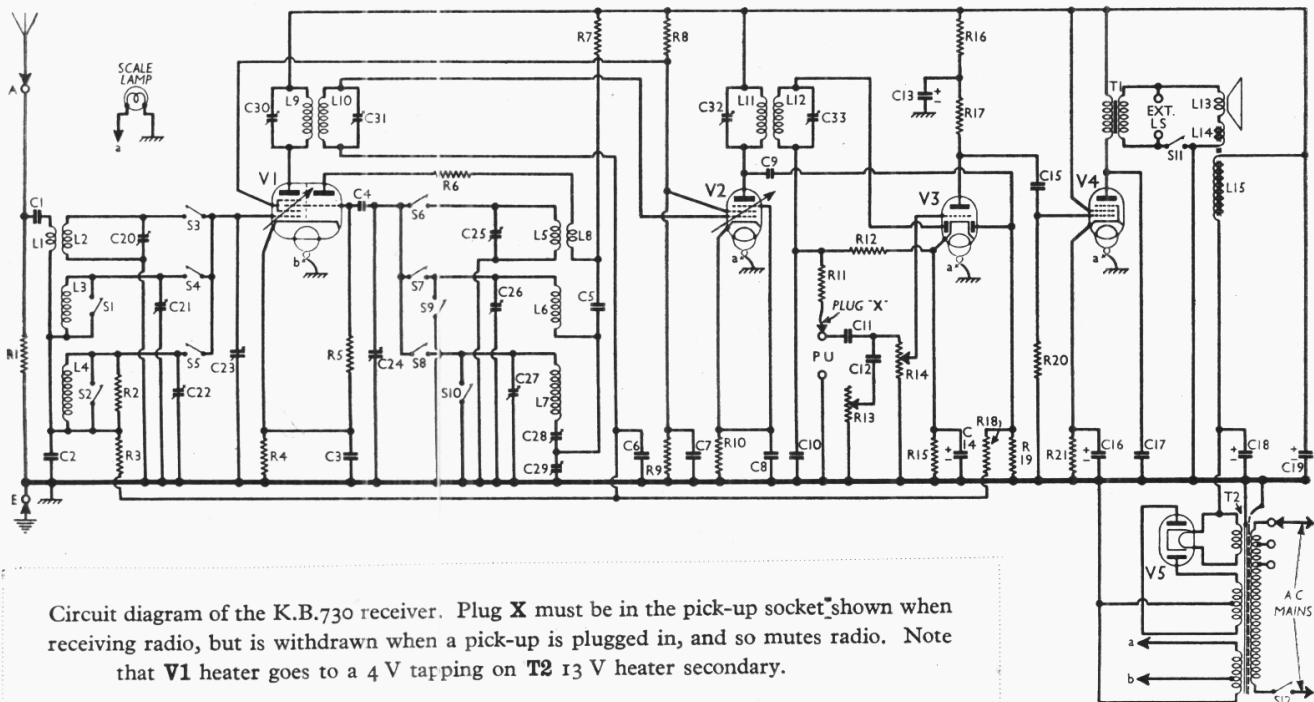
is developed across load resistance **R19** and fed back through decoupling circuits to FC (except on SW) and IF valves, giving automatic volume control. Delay voltage, together with GB for **V3** triode section, is obtained from drop along resistance **R15** in the cathode lead to chassis.

Resistance-capacity coupling by **R17, C15** and **R20** between **V3** triode and pentode output valve (**V4, Brimar 7D5**). Fixed tone correction by **C17** in anode circuit. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1**. Provision is made by the inclusion of switch **S11** for muting the internal speaker if desired by breaking its speech coil circuit.

HT current is supplied by IHC full-wave rectifying valve (**V5, Brimar R2**). Smoothing by speaker field **L15** and dry electrolytic condensers **C18, C19**. It should be noted in connection with the heater winding of the mains transformer **T2** that it provides 13 V between the end connected to chassis and that marked **a** in our diagram for **V2, V3** and **V4** heaters, whereas between chassis and the tapping marked **b** 4V is obtained for **V1** heater. The scale lamp, it will be seen, is run from 13 V.

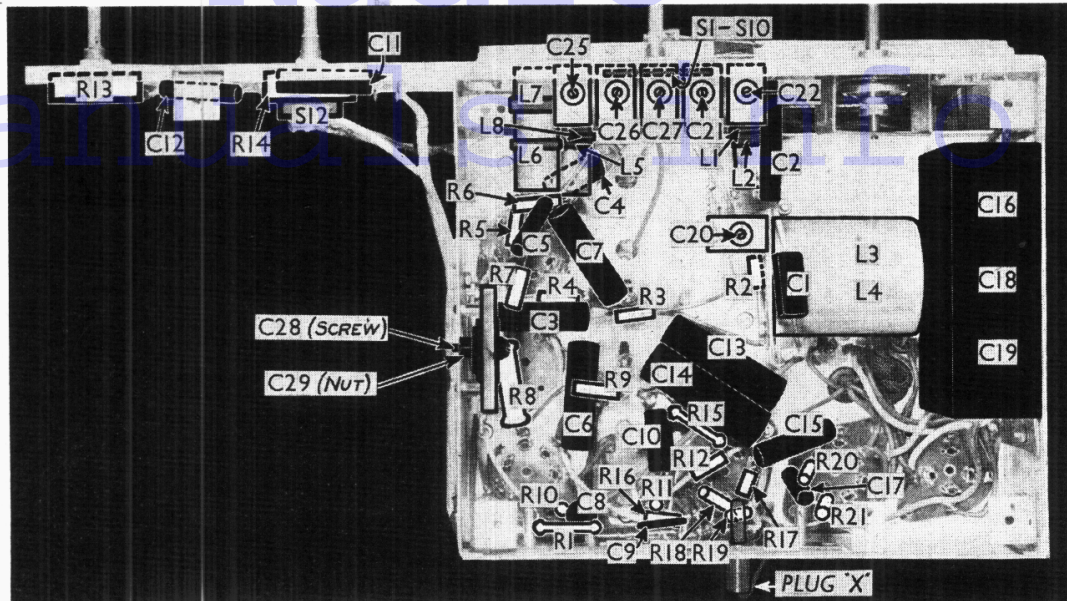
DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (two round-



Circuit diagram of the K.B.730 receiver. Plug **X** must be in the pick-up socket shown when receiving radio, but is withdrawn when a pick-up is plugged in, and so mutes radio. Note that **V1** heater goes to a 4 V tapping on **T2** 13 V heater secondary.

Under-chassis view. The switch unit is beneath the row of trimmers at the front. C28 and C29 are in a dual unit, adjustable by means of a screw and a nut. The plug X at the back of the chassis is removed when using a pick-up and mutes radio. It must always be in position when receiving radio.



head wood screws) gives access to most of the components beneath the chassis.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the four control knobs (recessed grub screws), the four bolts (with lock and claw washers) holding the chassis to the bottom of the cabinet and the two round-head wood screws (with washers) holding the top of the scale assembly to the front of the cabinet. Now unsolder the speaker leads, when the chassis can be withdrawn.

When replacing, connect the speaker leads as follows, numbering the tags from bottom to top:—1, brown; 2, blue; 3, red. The black lead goes to the tag on the speaker frame. Note that the large control knobs go on the outer spindles.

Removing Speaker.—The speaker can be removed from the cabinet by unsoldering the leads from the chassis, removing the extension speaker socket panel (two round-head wood screws) and slackening the three clamps holding it to the sub-baffle.

When replacing, see that the transformer is on the right and connect the leads as above.

CONDENSERS		Values (μF)
C1	Aerial coupling condensers ..	0.0005
C2	V1 osc. CG condenser ..	0.005
C3	V1 cathode by-pass ..	0.1
C4	V1 osc. CG decoupling ..	0.00005
C5	V1 osc. anode coupling ..	0.005
C6	V2 CG decoupling ..	0.1
C7	V1, V2 SG's decoupling ..	0.1
C8	V2 cathode by-pass ..	0.1
C9	Coupling to V3 AVC diode ..	0.00005
C10	IF by-pass condenser ..	0.0005
C11	AF coupling to V3 triode ..	0.02
C12	Part of variable tone control ..	0.003
C13*	V3 triode anode decoupling ..	2.0
C14*	V3 cathode by-pass ..	25.0
C15	V3 triode to V4 AF coupling ..	0.02
C16*	V4 cathode by-pass ..	25.0
C17	Fixed tone corrector ..	0.001
C18*	HT smoothing ..	8.0
C19*	HT smoothing ..	16.0
C20†	Aerial circuit SW trimmer ..	—
C21†	Aerial circuit MW trimmer ..	—
C22†	Aerial circuit LW trimmer ..	—
C23†	Aerial circuit tuning ..	0.0005
C24†	Oscillator circuit tuning ..	0.0005
C25†	Osc. circuit SW trimmer ..	—
C26†	Osc. circuit MW trimmer ..	—
C27†	Osc. circuit LW trimmer ..	—
C28†	Osc. circuit LW tracker ..	—
C29†	Osc. circuit MW tracker ..	—
C30†	1st IF trans. pri. tuning ..	—
C31†	1st IF trans. sec. tuning ..	—
C32†	2nd IF trans. pri. tuning ..	—
C33†	2nd IF trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 232 V, using the 225 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case, V3 should become unstable when its anode current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0.1 μF from grid (top cap) to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X41	{ 272 Oscillator 93	{ 4.0 3.3	85	3.0
V2 9D2	272	4.7	85	1.2
V3 11D3	76	0.3	—	—
V4 7D5	255	37.0	272	6.4
V5 R2	309†	—	—	—

† Each anode, AC.

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	Aerial circuit shunt ..	10,000
R2	LW aerial circ. damping ..	250,000
R3	V1 hexode CG decoupling ..	500,000
R4	V1 fixed GB ..	200
R5	V1 osc. CG resistance ..	50,000
R6	Oscillator reaction damping ..	100
R7	V1 osc. anode HT feed ..	50,000
R8	V1, V2 SG's HT feed potential ..	20,000
R9	divider resistances ..	15,000
R10	V2 fixed GB resistance ..	500
R11	IF stopper ..	100,000
R12	V3 signal diode load ..	500,000
R13	Variable tone control ..	500,000
R14	Manual volume control ..	500,000
R15	V3 triode GB; AVC delay ..	5,000
R16	V3 triode decoupling ..	100,000
R17	V3 triode anode load ..	250,000
R18	AVC line decoupling ..	500,000
R19	V3 AVC diode load ..	500,000
R20	V4 CG resistance ..	250,000
R21	V4 GB resistance ..	400

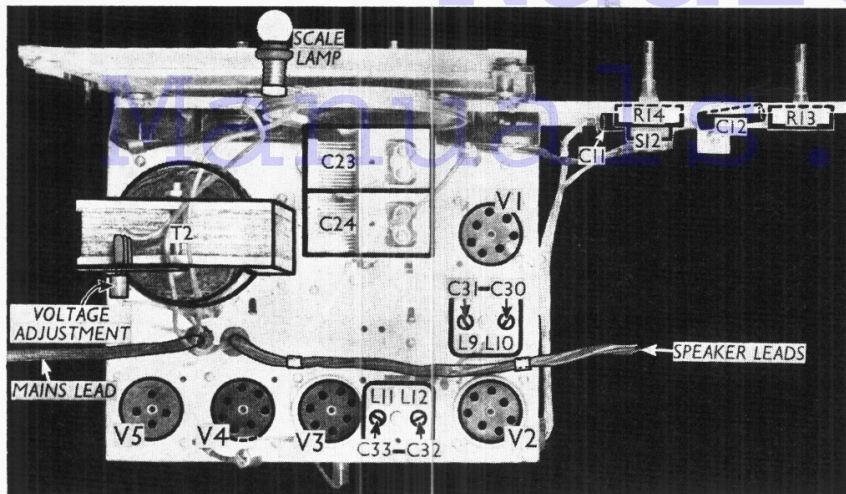
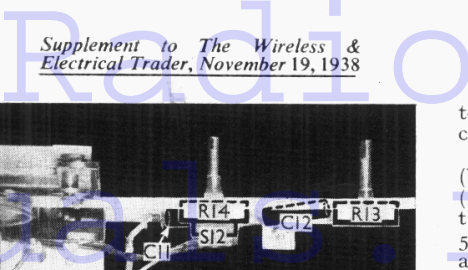
OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil ..	0.1
L2	Aerial SW tuning coil ..	Very low
L3	Aerial MW tuning coil ..	3.0
L4	Aerial LW tuning coil ..	13.0
L5	Osc. circuit SW tuning coil ..	Very low
L6	Osc. circuit MW tuning coil ..	3.75
L7	Osc. circuit LW tuning coil ..	9.5
L8	Oscillator SW reaction ..	0.1
L9	1st IF trans. { Pri. ..	8.0
L10	{ Sec. ..	8.0
L11	2nd IF trans. { Pri. ..	8.0
L12	{ Sec. ..	8.0
L13	Speaker speech coil ..	1.8
L14	Hum neutralising coil ..	0.1
L15	Speaker field coil ..	1,000.0
T1	Speaker input trans. { Pri. ..	400.0
	{ Sec. ..	0.3
	{ Pri., total ..	30.0
	{ Heater sec., total ..	0.4
	{ Rect. heat. sec. ..	0.15
	{ HT sec., total ..	210.0
SI-S10	Waveband switches ..	—
S11	Speaker switch ..	—
S12	Mains switch, ganged R14 ..	—

GENERAL NOTES

Switches.—S1-S10 are the waveband switches, in a single rotary unit beneath the chassis. This is indicated in our under-chassis view, beneath the strip of five trimmers at the front. A diagram of the switch unit is given on the back of this sheet, as seen when looking from the rear of the underside of the chassis.

The table on the back of this sheet gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and C, closed.

S11 is the internal speaker muting switch, located on the external speaker connection panel at the rear of the cabinet (not shown in our illustrations). The switch is of the screw type, and when its knob is fully screwed up, the switch is



Plan view of the chassis. Note the components on the extension to the right. V1 is a 4 V valve, whereas all the others are 13 V types.

closed. On unscrewing the knob, S11 opens, and breaks the internal speaker speaker speech coil circuit.

S12 is the QMB mains switch, ganged with the manual volume control R14.

Coils.—L1, L2; L5, L8; and L6, L7 are in three unscreened tubular units beneath the chassis, arranged round the switch unit. L3, L4 are in a screened unit, also beneath the chassis, mounted horizontally. The IF transformers L9, L10 and L11, L12 are in two screened units on the chassis deck, with their associated trimmers.

Scale Lamp.—This is a Tre-Vita MES type, rated at 12-16 V, 0.3 A.

External Speaker.—Two sockets are provided on a small panel at the right hand side of the rear of the cabinet for a low impedance (2.5 O) external speaker. The screw switch S11 is fitted to the panel for muting the internal speaker, if desired.

Condensers C16, C18, C19.—These are three dry electrolytics in a single carton beneath the chassis. A common negative (black) lead is used for C18 and C19. The yellow lead is the positive of C18 (8 μF, 450 V working), while the red lead is the positive of C19 (16 μF, 450 V working). The brown lead is the negative and the green lead the positive of C16 (25 μF, 25 V peak).

Trackers C28, C29.—These are in a dual unit, fitted to one of the side plates

of the chassis, and are adjustable by a concentric nut and screw. The screw adjusts C28 and the nut C29.

Plug X.—In the circuit diagram and the under-chassis view, is a plug marked X. Normally this plug must be inserted in the right-hand pick-up socket, looking at the rear of the set. It connects R11 to C11 for radio reception. When a pick-up is used, plug X is withdrawn, thus muting radio, and permitting the pick-up plugs to be inserted in their two sockets.

Valve Heater Voltages.—Note that V2 to V4 are 13 V valves, whereas V1 is a 4 V type, run from a tapping on the 13 V heater winding of T2.

Resistances R5, R11.—In our chassis R5 is coded 51,000 O and R11, 99,000 O. The makers give values of 50,000 O and 100,000 O respectively.

CIRCUIT ALIGNMENT

IF Stages.—Switch set on, and turn volume control to maximum. Connect signal generator between control grid (top cap) of V1 and chassis. Feed in a 464 KC/S signal, and adjust C30, C31, C32 and C33 in turn for maximum output. Re-check these settings.

RF and Oscillator Stages.—When gang is at maximum, see that pointer coincides with the top ends of the scales. Connect signal generator, via a dummy aerial,

to A and E sockets, and keep volume control at maximum.

MW.—Switch set to MW, tune to 214 m (black dot) on scale, feed in a 214 m (1,400 KC/S) signal, and adjust C26, then C21, for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C29 (nut) for maximum output, while rocking the gang for optimum results. Repeat the 214 m adjustments as a check.

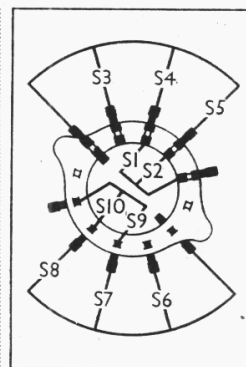
LW.—Switch set to LW, and tune to 1,000 m on scale. Feed in a 1,000 m (300 KC/S) signal, and adjust C27, then C22, for maximum output. Feed in a 1,715 m (175 KC/S) signal, tune it in, and adjust C28 (screw) for maximum output, while rocking the gang for optimum results. Repeat the 1,000 m adjustments as a check.

SW.—Switch set to SW, and tune to 17.6 m on scale. Feed in a 17.6 m (17 MC/S) signal, and adjust C25 for maximum output. Two peaks will be found, the correct one being that obtained with the lower capacity of C25 (nearest to fully unscrewed position). Now adjust C20 for maximum output, rocking the gang very slightly for optimum results. No tracker is provided on this band.

SWITCH TABLE AND DIAGRAM

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	C
S3	—	—	C
S4	—	C	—
S5	C	—	—
S6	—	—	C
S7	—	C	—
S8	C	—	—
S9	—	—	C
S10	—	C	C

Diagram of the switch unit, as seen from the rear of the underside of the chassis.



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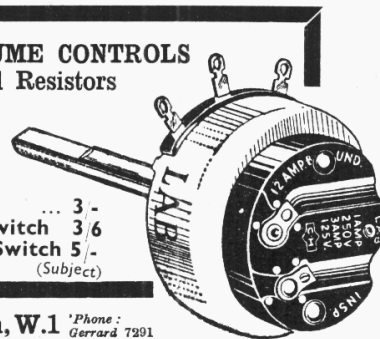
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